

CLAIMS

1. Amplifier of microwave signals of wavelength λ including a particular number N of active components coupled in parallel to a load impedance via an adapter (3), said adapter (3) comprising:

5 - a particular number N of susceptance compensators (41 to 4N; 4a to 4d) respectively connected to the outputs of N active components (11 to 1N; 1a to 1d) to compensate the output susceptances of the active components (41 to 4N; 4a to 4d), and

10 - a circuit for combining and adapting the conductances (5) having N inputs respectively connected to the outputs of the N susceptance compensators (41 to 4N; 4a to 4d) and an output connected to the load impedance (2) of the amplifier, characterized in that

15 - the circuit for combining and adapting the load conductances (5) of the active components comprises a particular number of line sections organized on M levels, level 1 being connected to the outputs of the N susceptance compensators (41 to 4N; 4a to 4d) via N respective line sections (L(1,1) to L(1,N) of equal electrical length that is an integer multiple of $\lambda/4$,

20 - the level M is connected to the load of the amplifier and each level other than level 1 includes a particular number of line sections of equal electrical length that is an integer multiple of $\lambda/2$, and

25 - each line section of a level other than level 1 is connected to one or more line sections of the level that precedes it and the number of line sections of each level decreases as the number of levels from the first level increases.

2. Amplifier according to claim 1, characterized in that the line sections of level M are connected to the load of the amplifier via at least one line section L(M+1,1) of electrical length that is an integer multiple of $\lambda/4$ forming an (M+1)th level.

30 3. Amplifier according to either claim 1 or claim 2, characterized in that the line sections of electrical length that is an integer multiple of $\lambda/2$ are divided into a plurality of lines of electrical length $\lambda/4$ of different characteristic impedance.

- 35 4. Amplifier according to claim 1, characterized in that the electrical

lengths of the line sections of the first level are equal to an odd integer multiple of $\lambda/4$ if the impedance presented to the input of the combiner by an active component turned off combined with its susceptance compensator is a short circuit in order to present an open circuit to the level 1 nodes.

5 **5.** Amplifier according to claim 1, characterized in that the electrical lengths of the line sections of the first level are equal to an even integer multiple of $\lambda/4$ if the impedance presented to the input of the combiner by an active component turned off combined with its susceptance compensator is an open circuit in order to present an open circuit to the level 1 nodes.

10 **6.** Amplifier according to any one of the preceding claims, characterized in that the sum of the electrical lengths connecting an input of the combiner to its output is equal to an odd integer multiple of $\lambda/4$ in order to produce an impedance inverter transformer.

15 **7.** Amplifier according to any one of the preceding claims, characterized in that each line section of a level other than level 1 is connected at the same node to the same number of line sections of the level that precedes it.

20 **8.** Amplifier according to any one of claims 1 to 7, characterized in that the circuit for combining and adapting the load conductances (5) of the active components is organized in two levels to adapt the load of the amplifier to only four active components (1a, 1b, 1c, 1d), a first level composed of four line sections (12a, 12b, 12c, 12d) of electrical length $\lambda/4$ and a second level composed of two line sections (13a, 13b; 14a, 14b) of electrical length $\lambda/2$ connected by one of their common ends to the load impedance of the amplifier, the two line sections (13a, 13b; 14a, 14b) of electrical length $\lambda/2$ being divided into two line sections of electrical length $\lambda/4$ with different impedances Z2 and Z3.

30 **9.** Amplifier according to any one of the preceding claims, characterized in that the circuit for combining and adapting the load conductances (5) of the active components is organized in two levels to adapt the load of the amplifier to only six active components (1a, 1b, 1c, 1d, 1e, 1f), a first level composed of six line sections (12a,...,12f) of electrical length $\lambda/4$ and a second level composed of two line sections (13a, 13b;

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14a, 14b) of electrical length $\lambda/2$ connected by one of their common ends to the load impedance (2) of the amplifier, the outputs of the susceptance compensators (4a,...,4f) being connected three by three via a line section (12a, 12b, 12c; 12d, 12e, 12f) of the first level respectively to one end of a line section (13a, 13b; 14a, 14b) of the second level opposite that connected to the load impedance (2) of the amplifier, the two line sections (13a, 13b; 14a, 14b) of electrical length $\lambda/2$ being divided into two line sections of electrical length $\lambda/4$ with different impedances Z2 and Z3.

10. Amplifier according to any one of the preceding claims, characterized in that the circuit for combining and adapting the load conductances (5) of the active components is organized in two levels to adapt the load (2) of the amplifier to only six active components (1a, 1b, 1c, 1d, 1e, 1f), a first level composed of six line sections (12a,...,12f) of electrical length $\lambda/4$ and a second level composed of three line sections (13a, 13b; 14a, 14b; 15a, 15b) of electrical length $\lambda/2$ connected by one of their common ends to the load impedance (2) of the amplifier, the outputs of the susceptance compensators (4a,...,4f) being connected two by two via a line section (12a, 12b; 12c, 12d; 12e, 12f) of the first level to a respective end of a line section (13a, 13b; 14a, 14b; 15a, 15b) of the second level opposite that connected to the load impedance (2) of the amplifier, the three line sections (13a, 13b; 14a, 14b; 15a, 15b) of electrical length $\lambda/2$ being each divided into two line sections of electrical length $\lambda/4$ with different impedances Z2 and Z3.

11. Amplifier according to any one of the preceding claims, characterized in that each susceptance compensator (41 to 4N; 4a to 4d) is composed of two line sections (5, 6) connected in series via a capacitor (7) between the output of the active component (11 to 1N; 1a to 1d) to which it is connected and the corresponding input of the circuit for combining and adapting the conductances (5) and a third line section connected between, on the one hand, the common point (9) between the capacitor (7) and the line section (5) connected to the output of the active component (11 to 1N; 1a to 1d) and, on the other hand, one terminal of a capacitor (10) of fixed capacitance connected by its second terminal to an earth point of the circuit (11), the capacitor (10)

of fixed capacitance being biased by a bias voltage applied to its first terminal that is determined as a function of the state of operation selected for the active component.

- 5 **12.** Amplifier according to claim 1, characterized in that the combiner is produced by a spatial power combination technique.